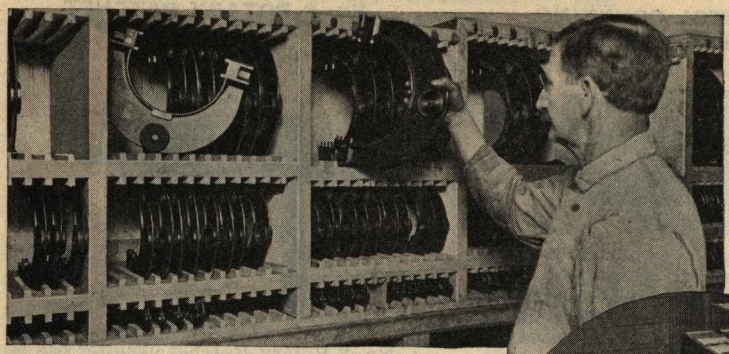
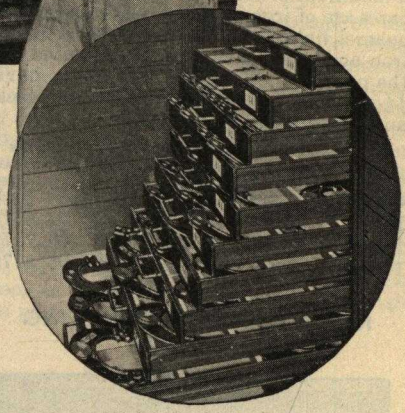
JOHANSSON ADJUSTABLE LIMIT SNAP GAGES

TWO SYSTEMS FOR KEEPING SNAP GAGES HANDY AND IN GOOD ORDER





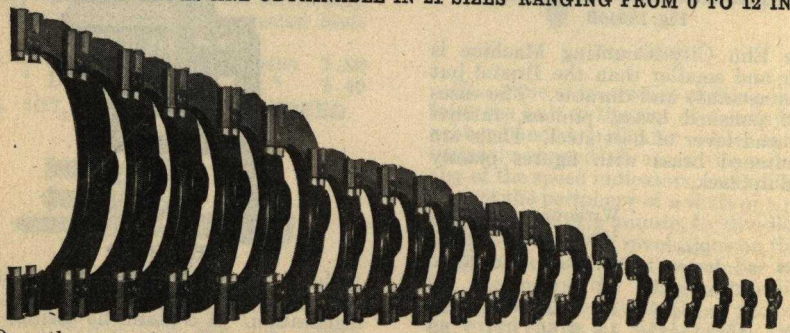
The limit system of manufacture is today recognized by all as the one modern method of manufacturing interchangeable parts at low cost. The limit system takes advantage of the two following facts that—

(1) It is impossible to work to absolute dimension.

(2) It is impossible to obtain absolute duplication.

When a machine-operator says that a given piece of work is "exact size," or that a number of pieces of work are "exactly alike in size," he merely means that they seem to be so, according to the measuring tools at his disposal. In actual practice, both exact dimension and exact duplication are impossible as well as unnecessary. There is sure to be some variation from the true size in spite of all that can be done to eliminate it. In the very highest form of precision work, this variation may be very slight, but it is there nevertheless.

JOHANSSON SNAP GAGES ARE OBTAINABLE IN 21 SIZES RANGING FROM 0 TO 12 INCHES



Once the proposition is accepted that variation from exactness is absolutely certain in everything, the question of interchangeable manufacture comes down to finding out just how much of this inevitable variation is permissible. In other words, it is finding out how inaccurate the work can be and still be suitable for its purpose. How wide can the limits be and still make a good piece of apparatus? And, as the closer the limits, the greater the cost of the work, limits should be as wide as possible.

JOHANSSON COMBINATION GAGE BLOCKS

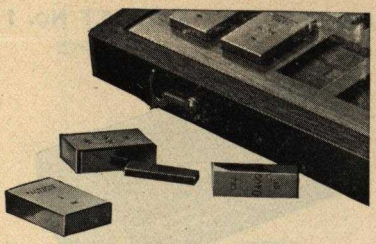


Fig. 31524A

Thousands of sets of Johansson Combination Sets have been supplied in the United States, in practically every locality, and the first user has yet to return one on account of it not being satisfactory. So universal have the use of these blocks become, that a shop without at least one set is an exception.

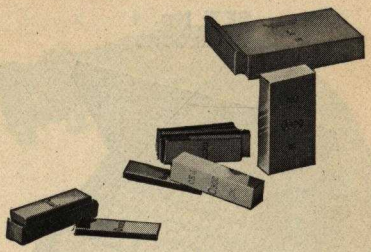
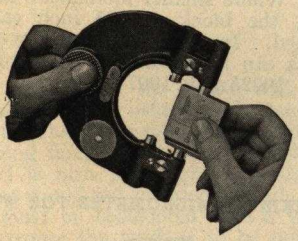


Fig. 31524B

Every manufacturer equipped with the Johansson Gaging System establishes his own bureau of standards. He accepts or rejects his own manufactured parts or the work of others without dispute because with Johansson Gages he can check himself.

DIRECT CHECKING

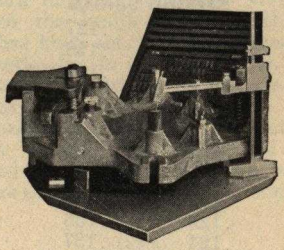


The time and material saved and the mistakes and arguments avoided are the reasons why America's foremost manufacturers of interchangeable parts have four, six or eight sets of Johansson Standards in the toolroom alone.

Johansson Gages are used direct, avoiding mistakes due to transferring sizes when laying out, building, and checking jigs, dies, fixtures, templets and special tools and gages.

They are self-checking. Blocks in any one set check each other and also check blocks in any other set. This feature not only proves accuracy beyond a doubt but makes it possible to detect wear on any single block in the system. Different mechanics get the same results, or the same mechanic can obtain the same result any number of times, because these gages do not depend upon the human element of touch.

CHECKING HEIGHT OF REST PADS ON MILLING FIXTURE



The following bureaus of measurement use Johansson Gages in their own work as a practical, dependable measuring tool:

WASHINGTON.—Bureau of Standards.

PARIS.—Bureau International des Poids et Mesures.

LONDON.—National Physical Laboratory.

OTTAWA.—Imperial Munitions Board.

PETROGRAD.—Chambre Centrale des Poides et Mesures.

BERLIN.—Kaiserliche Normal Eichungs Kommission.

BERNE.—Eidgenossisches Amt fur Mass und Gewicht.

The value of Johansson Gages as a standard or reference gage is small when compared to their value when used as intended by their inventor—as a working gage for toolmakers.

JOHANSSON COMBINATION GAGE BLOCKS

SET No. 1
81 BLOCKS

Fig. 31525A

SIZES IN INCHES

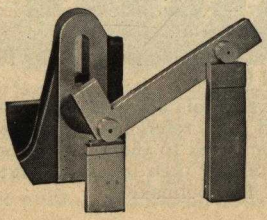
FIRST SERIES		
.1001	.1004	.1007
.1002	.1005	.1008
.1003	.1006	.1009

SECOND SERIES			
.101	.114	.127	.140
.102	.115	.128	.141
.103	.116	.129	.142
.104	.117	.130	.143
.105	.118	.131	.144
.106	.119	.132	.145
.107	.120	.133	.146
.108	.121	.134	.147
.109	.122	.135	.148
.110	.123	.136	.149
.111	.124	.137	....
.112	.125	.138	....
.113	.126	.139	....

THIRD SERIES			
.050	.300	.550	.800
.100	.350	.600	.850
.150	.400	.650	.900
.200	.450	.700	.950
.250	.500	.750	....

FOURTH SERIES			
1 in.	2 in.	3 in.	4 in.

SETTING A SINE-BAR



ACCESSORIES FOR SET No. 1

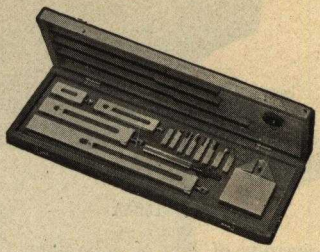
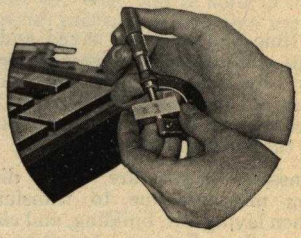


Fig. 31525B

The Johansson Set No. 1 is the one that may be seen in daily and hourly use in practically all American toolrooms and inspection departments. It gives sizes in .0001 (one ten-thousandth part of an inch). Where smaller increments are required, the block .10005 inch can be furnished. Increments in quarter-thousandths can be obtained by adding the blocks .10025 and .10075 inch.

CHECKING A MICROMETER FOR WEAR

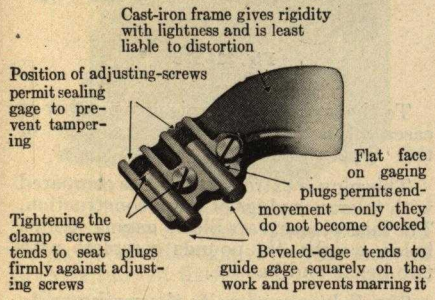


Hundreds of thousands of combinations are possible with this set of eighty-one blocks. It is arranged to take care of the average toolroom requirements. The accessories as shown above consist of three pairs of jaws for taking inside and outside dimensions, a scriber and center point, a straight edge, a base and four holders.

Price of No. 1 and other sets upon application.

JOHANSSON ADJUSTABLE LIMIT SNAP GAGES

SECTIONAL VIEW OF ARM


Cast-iron frame gives rigidity with lightness and is least liable to distortion
Position of adjusting-screws permit sealing gage to prevent tampering
Flat face on gaging plugs permits end-movement —only they do not become cocked
Tightening the clamp screws tends to seat plugs firmly against adjusting screws
Beveled-edge tends to guide gage squarely on the work and prevents marring it

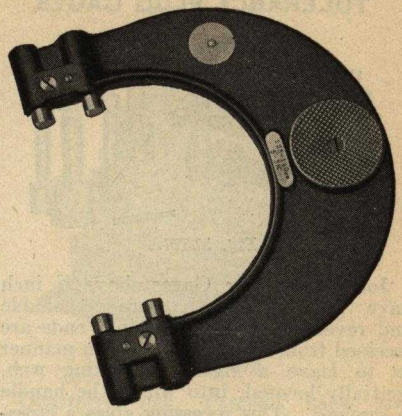


Fig. 31526A

In some work the limits will be in thousandths, in other work tenths of thousandths. The first is just right and anything finer would be too good. The second is also just right and anything coarser would not be good enough. Each case must be considered with a view to the purpose the work is to be put.

Experience teaches that the control of limits with any of the various measuring tools should not be left to the individual judgment of the operators. There is always the tendency to work to absolute dimensions. The better way is to provide fixed gages with the established tolerance appearing in the gages themselves. Johansson Snaps come into a shop ready to be put into the hands of the operators, thus eliminating the expense of making and maintaining solid snap gages. They keep the control of shop sizes and limits out of the hands of the individual machine operator. They prevent errors and save the user's time.

The same quality of fool-proofness applies with equal force to both unskilled operators and unskilled inspectors. As with the machine operators, either the "go" opening will pass over the work or it will refuse to do so. In any case, the inspector knows.

The operator's job is merely to see that the work he produces comes somewhere between the limits to which the snap gage has been set. He isn't measuring the work—he is gaging it. No expert knowledge of working to thousandths is necessary.

Johansson Snaps offer complete protection against the effects of wear, changed limits and entirely new sizes, as they are easily reset with a common screwdriver.

No.	Range Inches	Diam. Gaging Plugs Inches	Approx. Weight	Price Each
0	0 to ¼	.275	5 oz.	**9.50**
1	¼ " ½	.275	5 "	**10.00**
2	½ " ¾	.275	6 "	**10.50**
3	¾ " 1	.275	7 "	**11.00**
4	1 " 1¼	.275	7 "	**11.50**
5	1¼ " 1½	.275	8 "	**12.50**
6	1½ " 2	.354	14 "	**14.00**
7	2 " 2½	.354	1 lb.	**15.00**
8	2½ " 3	.393	1 lb. 5 oz.	**16.00**
9	3 " 3½	.393	1 " 6 "	**17.00**
10	3½ " 4	.393	1 " 8 "	**18.00**
11	4 " 4½	.472	2 " 3 "	**19.50**
12	4½ " 5	.472	2 " 5 "	**21.00**
13	5 " 5½	.472	2 " 10 "	**22.50**
14	5½ " 6	.472	2 " 13 "	**24.00**
15	6 " 7	.590	4¼ lbs.	**25.50**
16	7 " 8	.590	4¾ "	**27.00**
17	8 " 9	.590	5¼ "	**28.50**
18	9 " 10	.590	6 "	**30.00**
19	10 " 11	.590	6¾ "	**31.50**
20	11 " 12	.590	7 "	**33.00**

JOHANSSON PLUG GAGES

TOLERANCE PLUG GAGES

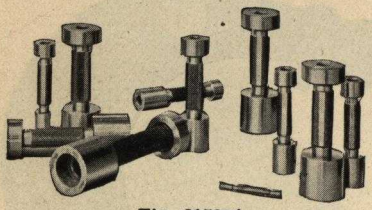
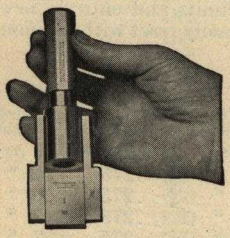


Fig. 31527A

Johansson Plug Gages above $\frac{47}{64}$ inch have gaging ends that are detachable and reversible. These gaging ends are recessed from each end in such a manner as to leave a rigid, supporting web, centrally located, into which the handle is screwed. This recessing gives a cross-section which is substantially an I-beam, a construction which makes for lightweight and permanency of size and shape. Barring wear, these plugs will keep their size and shape indefinitely.

Hollow handles are fitted to all sizes from $2\frac{1}{2}$ inches up. This still further reduces the weight and eliminates the usual air pocket when gaging blind holes.

TESTING A PLUG



These gages are exceptionally accurate, comparatively free from change in size and able to resist wear. They present a smooth surface with a marked absence of microscopic imperfections.

These tools are fine examples of Johansson methods of heat-treating and seasoning.

The usual internal stresses have been relieved so that growth or shrinking are controlled. Distortion does not take place.

Johansson Tolerance Plug Gages are furnished to any limits specified.

Prices upon application.

ADJUSTABLE LIMIT PLUG GAGES

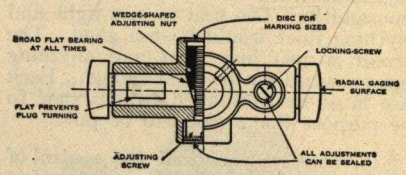
Fig. 31527B

To the trained mechanic any number of cases will come to mind where a gage of this type would be suitable.

This plug is extremely light as compared with tolerance plugs of usual construction. The largest size, capable of gaging 6-inch holes, weighs $3\frac{3}{4}$ pounds complete with two heads and handle.

The lightness permits the workman to support the weight of the gage and still retain a gaging touch.

Another feature is the ease with which the roundness of a hole can be checked.



ADJUSTABLE LIMIT PLUG GAGES

Gage No.	Approximate Range, Inches	Price Each
5	1.417 to 1.535	18.00
6	1.535 " 1.654	18.50
7	1.654 " 1.772	19.00
8	1.772 " 1.890	19.50
9	1.890 " 2.047	20.00
10	2.047 " 2.323	21.00
11	2.323 " 2.598	22.00
12	2.598 " 2.874	23.00
13	2.874 " 3.110	24.00
14	3.110 " 3.346	25.00
15	3.346 " 3.583	26.00
16	3.583 " 3.858	27.00
17	3.858 " 4.213	28.00
18	4.213 " 4.646	31.00
19	4.646 " 5.118	33.00
20	5.118 " 5.669	35.00
21	5.669 " 6.181	38.00